

An Open Building Strategy for Achieving Dwelling Unit Autonomy in Multi-unit Housing

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Abstract

In the next 20 years, increasing numbers of American families will choose to live in urban areas for reasons of proximity to work and cultural amenities, reduction of travel time, and so on. This paper focuses on a model of a service-oriented building industry to help make housing suited to individual household preferences in environments where the detached house is no longer possible. It specifically addresses the critical need to achieve autonomy of the individual dwelling to reduce social and technical conflict in mixed use and multi-unit buildings under conditions of change and distributed control.

Key Words:

open building; multi-unit housing; distributed control; capacity

Introduction

Multi-unit housing (elevator, walk-up and row house types) is becoming an attractive alternative to detached "sprawl" in many regions of the United States. Given this premise, the research on which this paper is based has focused on rethinking the "whole building" process in housing with the goal of giving greater autonomy to the individual unit in multi-unit buildings. For that to be accomplished, both physical and organizational "entanglement" - characteristic of multi-unit buildings - needs to be overcome. The cases reported on here demonstrate one way to accomplish that goal.

It is well known that condominium and other multiple occupancy residential projects are more prone to legal conflict, difficult remodeling, renovation and upgrade processes, than any other residential occupancy type. This can be largely attributed to physical "entanglement" of the "common elements", the "limited common elements" and the "individual elements". That is, the physical parts constituting the individual dwelling unit are not unambiguously "autonomous". Technical and spatial decisions about one unit - having to do with resident preferences, income, and so on - are entwined with decisions about other units, producing conflict and overlapping claims.

Buildings are increasingly complex. Social change is accelerating. Given

these circumstances, it is important to design and construct multi-unit buildings to avoid conflict, reduce dependencies among and between parties and the parts of the building they control, and thus achieve maximum autonomy or freedom of decisions for each individual unit.

The point of fundamental importance is to make a clear distinction between the “shared” parts and the “individual” parts (Habraken, 2000). In large projects, this distinction will help make living in multi-unit buildings more attractive to households who now enjoy the relative autonomy of living in detached houses (traditionally giving the most freedom of any housing option) in typical suburban developments.

The approach reported on in this paper – given the name "residential open building" in international theory and practice (Kendall, 1999) - can be one part of the effort to make urban living attractive to a variety of households, thus contributing to the bundle of strategies serving as an antidote to sprawl.

This approach can also be seen as a tool for achieving – over time in a given building – the goal of income mixing and community stability. That is, instead of designing housing according to household income (often assuming fixed incomes over time), an open building approach enables a more dynamic balance between physical assets and changing household income and status over time. It helps avoid the trap of real estate development and building practices based on (income) class. It also is a tool in adjusting our practices from a “scrap and build” approach to urban development to a “sustainable stock” approach. The notes that follow illustrate these points.

HISTORICAL OVER EMPHASIS ON TECHNOLOGY

The detached house is the preferred type in many regions in large measure because it affords independence and freedom of action. Therefore, the dream of the autonomous dwelling is not new.

Recognition of the importance of autonomy of the individual unit in multi-family buildings is also not new. Yet the overemphasis on technology has, in part, doomed efforts to accomplish this dream. LeCorbusier’s provocative diagrams first captured this idea (Girsberger, 1967) in his “unite” projects. ARCHIGRAM’s plug-in city showed dwellings moved from one place to another with cranes (Cook, 1967). Operation Breakthrough had the TOWNLAND scheme (Bender, 1973). The Metabolists in Japan worked on this idea of manufactured dwelling pods (Ross, 1978). Herbert tells the story of the failure of brilliant architects to harness manufacturing in the service of housing (1984). SITE later pictured “vertical real estate” (Wines, 1989).

The lessons from these heroic efforts should include several points that may be evident but have not been largely absent in current theorizing and

academic discourse: a) housing is not only about bricks and mortar. Second, housing is not only about professionals - non-professionals are a vital part of the housing process; b) housing must fit into its local fabric, and c) housing is about processes that extend over time. An overemphasis on “technical fixes” seems shortsighted in light of these lessons.

OPEN BUILDING: BALANCING TECHNOLOGY AND CONTROL

An international network of practitioners and researchers (CIB W104 Open Building Implementation) have studied these phenomena and, based on 30 years of practical developments, have come to understand a number of related ideas about the making of environment. For instance:

- *The idea of distinct Levels of intervention in the built environment, such as those represented by 'support' and 'infill', or by urban design and architecture (as the diagram below indicates).*
- *The idea that users / inhabitants may make design decisions as well.*
- *The idea that, more generally, designing is a process with multiple participants also including different kinds of professionals.*
- *The idea that the interface between technical systems allows the replacement of one system with another performing the same function. (as with different fit-out systems applied in a same base building.)*
- *The idea that built environment is in constant transformation and change must be recognized and understood.*
- *The idea that built environment is the product of an ongoing, never ending, design process in which environment transforms part by part.*

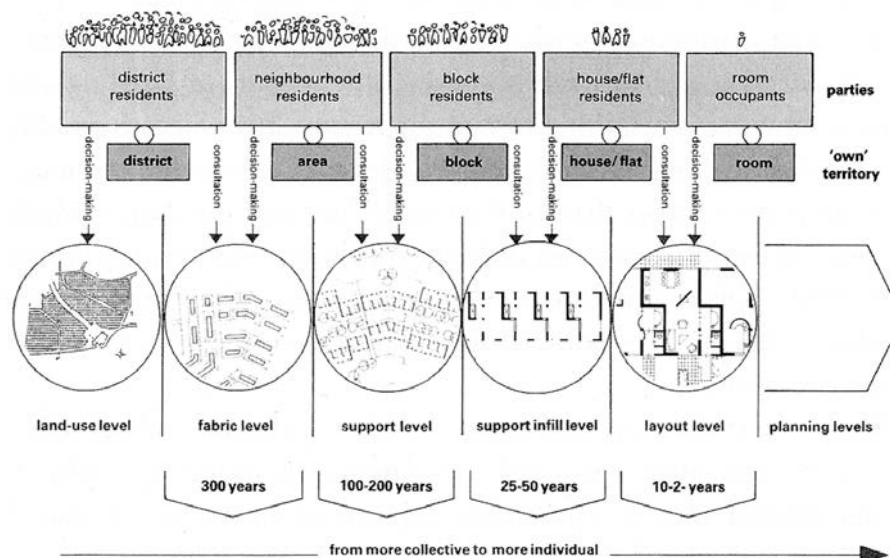


Figure 1: Principal of Levels, from OBOM, TU Delft.

Those who subscribe to an Open Building approach seek to formulate theories about the built environment seen in this dynamic way and to develop methods of design and building construction that are compatible with it (Habraken website). Two diagrams capture the basic principle of diversity.

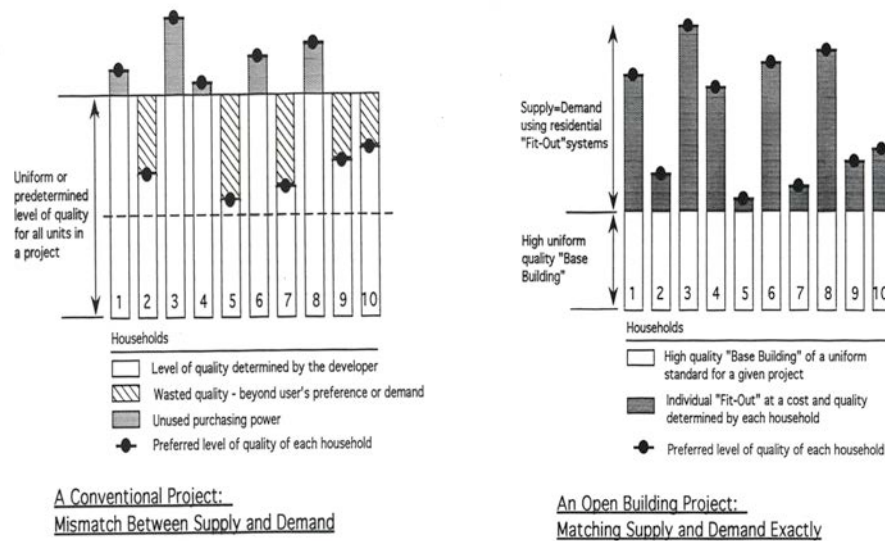


Figure 2: Matching supply and demand (Dekker, 1994)

CASES OF OPEN BUILDING

Hundreds of buildings containing thousands of dwelling units that are explicitly and intentionally designed and constructed on open building principles and methods have been realized in the past thirty years, in the Netherlands, France, Switzerland, Finland, Japan and China (Kendall, 1999). Every year, more projects come to light around the world including the United States and Canada.

Many have been realized without any knowledge that they are developments toward open building. This fact is important since their implementation is the result not of imported ideas but of local necessity.

Following are four diverse projects, three from the Netherlands and one from Japan, each showing the basic principles of residential open building.

Papendrecht, Molenvliet, The Netherlands, 1977



Figure 3: photo by the author Figure 4: photo by Dr. Kazunobu Minami

The winner of a competition for 2800 dwellings at a density of 30 units/ha, this project won on the combined merits of its urban design, architecture and participatory process. The project's 124 dwellings surround courtyards in two-to-four story blocks. The "base building" (the structure, roof, main utility systems, etc.) consists of a highly uniform concrete framework of piers and slabs, with regularly placed openings in the slabs for vertical mechanical chases and stairs inside individual dwellings.

The design of the base building allows for a wide variety in unit sizes and floor plans. A prefabricated wooden façade "kit" was also used. Specific characteristics of the façade (e.g. the arrangement of doors and windows and color of panels) were decided by individual occupants.

The fit-out or infill (the parts and spaces decided for each individual dwelling unit) was determined after arranging dwelling units of required floor area, or "parceling out" within the base building. The fit-out includes interior partitions, doors and trim, bathroom cabinets and fixtures, kitchen cabinets and equipment, as well as electrical, piping and mechanical systems for heating.

The project includes many traditional elements of Dutch urban design and housing – pitched roofs, wooden windows, doors into courtyards, mixed uses (there is a doctor's office, small shops, and commercial offices).

Recently a team of Japanese researchers conducted a post occupancy survey and found that the project remains in excellent condition (Minami, 2001)

Split Hendrick Nord, Amsterdam, the Netherlands, 1996



Figure 5: Photo by author



Figure 6: Photo by author

Within the older sections of Amsterdam, there is often no possibility to move to better accommodations if a family wants to stay in the neighborhood to maintain social networks. This situation led a number of families to organize a process the result of which is this building of 28 apartments. The building has 16 government subsidized units and 12 “free-sector” units. The design process was organized in two phases. The group of families worked with the architect to design the building, leaving the individual units to be decided by each individual family. In the second stage, apartments were assigned and individual preferences discussed. No two dwellings are alike.

Since the building was constructed in 1996, several households have altered their unit interiors. This project was one of the early examples under the new government policy of stimulating builders to build for the market and was recently recognized in a national awards program.

Wenswonen, Zaltbommel, the Netherlands, 2001



Figure 7: Photo by the author

Figure 8: Photo by the author

This is project of 38 townhouse dwellings has two opposing rows of units facing a residential park. Each unit has two or three floors. The floor plans, facades and extensions can be designed by the residents using the Wenswonen (Desirable Living) concept.

The project uses a systematic base building design and construction process, with a combination of factory production and on-site construction. The goal is to provide “capacity” in several respects. To assist homebuyers, a simple user interface software was developed using libraries of elements from which buyers can “compose” their home.

For each townhouse, users can choose a small dwelling, or can extend it with the addition of a third floor or a rear extension. Following this decision, floor plans are designed. Because the base building electrical, plumbing and ventilation systems have been carefully designed with multiple points of attachment, buyers can select a variety of positions for bathrooms and kitchens. Following these decisions, further choices are available for style of cabinets, finishes, and other details.

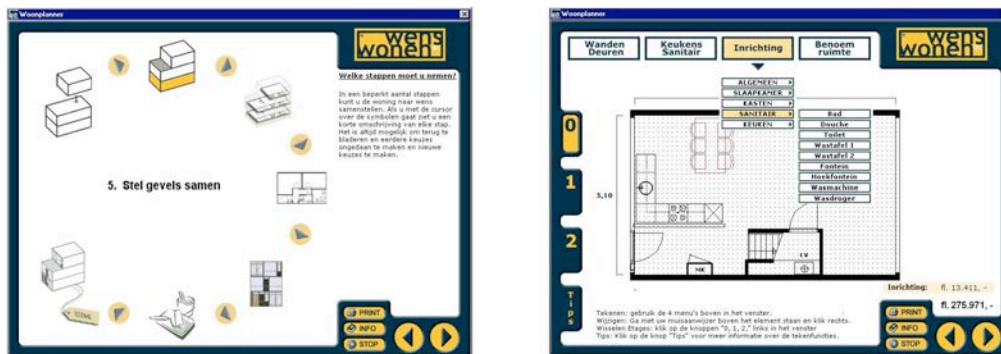


Figure 9: from the Wenswonen literature

Based on a view of social responsibility balanced with the demands of corporate profitability, this project is an attempt to find solutions to the issues that emerge in a changing society. A purchasers association has been formed for the project, in which each homeowner becomes a member at the time of purchase of the home. The purchasers association (home owners association) is responsible for, among other things, the maintenance of the pergola, the plantings, the paintwork of the exterior, the sun blinds and the public circulation and parking area (Wenswonen). Other projects are planned.

Next 21, Osaka, Japan, 1994 - present



Figure 10: Photos by the author



Figure 11: Photo by the author

Next 21 is an experimental 18 unit housing project, built in anticipation of the more comfortable life urban households will characteristically enjoy in the 21st century in Japan. Conceived by Osaka Gas in collaboration with the Next21 planning team, the project includes experiments in new energy and waste handling equipment, new changeable façade systems, and dimensional coordination agreements used to organize the high degree of “flexibility” available in unit size and layout planning.

The base building or skeleton was designed by one team, and the façade system by another. Thirteen different architects designed the 18 units. Common piping is routed below the “streets in the air”, and the mechanical systems within the dwellings units are hidden below the raised floor. Since the building was completed in 1994, several units have been completely reconfigured, including their facades (Kendall, 1999).

ORGANIZATIONAL ISSUES

These case studies are indicative of the importance of the organizational dimension of housing processes, demonstrating that housing is not only a technical matter, but involves agreements among a variety of parties. Legal issues are relevant (Barton, 2003). Condominiums, with a tradition in the

United States dating from the 1960's, are technically and legally contentious (Butt, 1993)

Co-housing, a popular organizational housing alternative pioneered in Denmark and now relatively widespread in the United States, demonstrates the value in certain circumstances of this hybrid condominium form of ownership, where the distinction between a “commons” and separate “individual” territories is being rethought. In the Netherlands, the BuyRent scheme has come into its own, promoted by Het Oosten, a large development company in Amsterdam. Here, a developer makes available for rent an empty space in a building, This space is then filled in by an occupant who purchases the fit-out need to inhabit the space (Kendall, 1999). In Japan, a complex formula to solve the organizational dilemma of insufficient land being available for residential development was developed in the “Tsukuba Method”. It addressed a number of problems related to the “right-to-use” laws concerned with land development, land ownership and household control (Kendall, 1999)

In all cases, the basic question is simple: What should be decided by the higher level – the “group”, and what should be decided by the “individual”? This is the question Habraken framed in 1960 (Habraken, 2000) and which open building seeks to address in various ways.

TECHNICAL ISSUES

While organizational issues are key, technical issues nonetheless present significant hurdles. One dimension of the technical issues that has been a focus of detailed studies deals with nascent developments in the building industry called “kitting” or “product bundling” (Kendall, 2003). Shifts from a product focus to a service focus in the building industry are also studied (Yashiro, 2002) as well as research in work structuring (Tsao et al, 2000) and lean supply chains (Ballard and Howell, 1995). In addition, studies are being conducted on alternatives in supply channel management as exemplified in the Matura Infill System brought to market in the Netherlands ten years ago but no longer in use (Kendall, 1999).

CONCLUSIONS

A powerful motive in the developments discussed here is to harness the full capacity of industrial production in support of better and more agile housing environments and individual decision making focused on “the act of dwelling”. (Habraken 2000).

Doing so requires that more of the ‘value-added’ in housing processes and products be separated from the part of the house known as “real property”.

Real estate is deeply political, is related to local geotechnical and climatic conditions, to the local sense of place and urban design, as it should be. But an increasingly large part of the “whole house” can be safely uncoupled from these conditions. This formulation is the open building approach – distinguishing the decisions (and systems) made for the “public” from the decisions (and products) made in respect to the individual occupant. This means - potentially – two distinct markets and two distinct processes, not in conflict but in coordination.

A parallel is found in highways and the vehicles using them, the former being public, shared and with capacity to “accommodate” a range of vehicles, the later being the private investment using the shared system and obeying its rules.

Studies on the implementation of the open building approach in the United States indicate that the design knowledge needed to provide architectural services in tune with “accommodation capacity” is not difficult to learn. We are teaching graduate students and are demonstrating the principles in cooperation with developers, architects and engineering consultants. Engineering consultants can design mechanical, electrical and plumbing systems in line with the principles of open building. Contractors understand issues of pricing and logistics, and developers find value in the decision deferment benefits of distinguishing a base building from its more variable fit-out.

The one dominating issue now facing the industry is the organization of skills related to the concept of “kitting” or “product bundling” in the service of JIT residential fit-out. To implement this approach we need to organize multi-skilled teams of trained installers who do not organize their work along the traditional lines of carpenter, electrician, plumber, sheet rock installer, tile setter, and so on. We recognize – as the automobile industry has learned in the production of the Saturn – that fit-out installation teams are now needed. In addition, we need new hybrid businesses that can deliver single source responsibility for “turn-key”, just-in-time interior fit-out, with the associated adjustments to the regulatory review process.

These are the next frontiers in the reorganization of the decision process for a more agile, sustainable 21st century housing stock.

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